Chapter 11 CONSTRUCTION DOCUMENTS

A. General

This chapter outlines the requirements of the Construction Documents (Final) Submittal. This submittal will be presented as a narrative report with cost estimate, stamped reproducible documents and specifications complete and ready for construction. This submittal will incorporate all the requirements of the corrected Schematic (and/or Progress Development) Design, plus additional information to complete the design.

B. Objective

The Construction Document submittal is intended to present a biddable design package conforming to all the appropriate criteria.

C. Review Comments and Revisions

Changes to the approved corrected schematic design will not be permitted unless these changes are the result of review comments, changes in criteria, changes in SOW, or unforeseen problems necessitating the A/E to alter the approved design. All the changes will be resolved through the EIC before proceeding.

D. Deviations

All deviations from applicable criteria such as Coast Guard construction criteria, building code, fire protection, life safety, OSHA, and safety manual, shall be summarized and enumerated in design analysis. Identify deviation, citing source and paragraph, what criteria require and nature of deviation, followed by authority granting waiver and date. If waiver has not been granted, indicate NONE.

E. Submittal Requirements

The Construction Document Submittal will consist of the following:

- 30"x42" vellum, Stamped, Original drawing set, unbound
- 8-1/2"x11" Stamped, Original specification, unbound.
- Electronic Copies of each on CD
- 8-1/2"x11" Final Design report, bound
- Final Cost Estimate.

Minimum requirements for the drawings, specifications, report and cost estimate, by discipline, are contained in Table 11 (Series). Requirements for submission of electronic media is contained in Appendix C.

F. Coordination with Government Contract Documents

FD&CC prepares both the Contract Solicitation and Division 01000 of the project specifications. While primary responsibility for coordinating the plans and specifications are the responsibility of the EIC, the A/E shall also review all the documents and ensure they are properly coordinated. This is particularly important when the solicitation calls for special structuring of the bids (e.g. Unit Prices, Additive Bid Items).

For more information on structuring of bids, see Chapter 5.

G. Final Specifications (All Disciplines)

Final specifications shall be provided incorporating any comments from previous reviews. See Appendix D for more information.

H. Cost Estimate

When required by the SOW, a Level 2 estimate reflecting the level of detail consistent with a 100 percent submittal shall be provided. Guidance for preparation of the Level 2 estimate is provided in Appendix E.

Table 11.1 Civil Design
100% Submittal Requirements

Drawings	
100% Submittal:	The 100% submission should include all drawings required for a 35% submittal plus all necessary detail sheets to complete the civil engineering portion of the project. In addition, other sheets required to show such information as profiles and cross sections for roads and ditches, profiles of sewer and drainage systems, and details of all appurtenances shall be included. The designer should review all Guide Specifications to be used in connection with the Civil Drawings. Most of the Guide Specifications contain design information in notes that indicate what must be shown on the drawings for proper coordination with the specifications. Some Guide Specifications contain standard details which must be included on the drawings if they are applicable to the project. *Drawings shall be fully coordinated with the other disciplines and the specifications.*
Location Plan:	See Schematic Requirements
Existing Site and Demolition Plan and Detail Drawings:	Show the following: a. All items to be demolished clearly shown b. Limits of removal c. Complete description of items to be removed d. Details, where necessary, of items to be removed e. Depth and dimension of affected pipelines and foundations f. Preloading of site g. Storage areas for materials to be removed
Site Plan and Detail Drawings:	Show the following: a. Site datum b. All necessary layout dimensions c. Street profiles d. Pavement sections and joint layout and details e. Handicapped provisions details f. Parking and other pavement markings g. Curb and gutter details h. Walk details i. Equipment pads j. Temporary facilities, locations and services k. Pavement repair details (i.e. utility crossings) l. Guard post details m. Fencing and gates location and details including security barriers for openings beneath fences and gates n. Wheel stop details o. Construction limits (if critical) p. All existing aboveground features which are not to be demolished q. Street sign details

Table 11.1 (Continued)	***Civil Design 100% Submittal Requirements***

Grading and Storm Drainage Plans and Detail Drawings:	Show the following: a. Existing and finish contours b. Existing and finish spot elevations c. Ditch profiles and sections d. Erosion protection e. Storm drainage piping layout, new and existing including security barriers f. Storm drainage structure details including security barriers g. Slopes and inverts of all pipes and profiles where necessary h. Inverts and top elevations of all structures i. Frames, grates and covers details j. Class or gauge of pipe k. Clearing and grubbing limits l. Grassing limits m. Benchmark information
Utility Plans and Detail Drawings:	Show the following: a. Overall layout of systems, showing line sizes b. New and existing systems shown c. Valve and fire hydrant locations d. Trench details showing bedding, backfill and utility warning tape e. Sizes of all components of systems indicated f. Building services coordinated with building plumbing drawings g. Separation of water and sewer lines h. Back-flow preventers i. Manhole spacing and details (including top and invert elevations) j. Clean-out location k. Pipeline profiles (gravity sewers normally, plus force main when required by State Permitting Agency) l. Manhole, frames and cover details m. Pump station location and details n. Air release valves location and details o. Locations coordinated with existing and other utilities p. Areas of hazardous material abatements

Calculations	
Design Calculations:	Revise the Schematic calculations and supplement as required for 100% design. Submit in same format as for Schematic submittal.
Computer outputs:	Shall be identified similar to the calculations and may be referenced as an appendix or attachment

Specifications	
Specifications:	Final specifications shall be developed per Appendix D.

Table 11.2 Architectural Design 100% Submittal Requirements

Drawings	
100% Submittal:	The 100% submission should include all drawings required for a 35% submittal plus all necessary detail sheets to complete the architectural portion of the project. *Drawings shall be fully coordinated with the other disciplines and the specifications.*
Architectural Floor Plans:	Floor Plans Showing: a. Complete dimensions. b. Spaces labeled with doors and windows numbered and door swings indicated. c. Enlarged plans/elevations/sections and details cross referenced per MIL-HDBK-1006/1 Reference Symbol guidance. d. Wall and partition thickness, secure area partition type, partitions that extend to overhead structure, fire and acoustical rated partitions (show rating). Reference symbols for each related section/detail. e. Water coolers, janitor sinks, floor drains, fire extinguisher cabinets, access ladders and hatches, "walk-off" mats in exterior entrances, public phones, signage directories, and built-in shelving and equipment. f. Wall and floor expansion/crack control joints. g. Boundaries of floor finish material changes and floor level transitions. h. Ramps, steps, and stairs. i. Necessary notes and schedules (use Key Notes for labels where practical). j. Key Plans when an entire floor is not shown on a single sheet. Exterior Elevation reference symbols may be shown on Key Plan. k. Clear designation between new and existing work. l. Limits of demolition and hazardous material removal
Reflected Ceiling Plans:	Reflected Ceiling Plans at same scale as floor plans showing: a. All ceiling types (identified by note or legend) and acoustical ceiling tile grid(s). b. Junctions of different ceiling finishes and ceiling level changes. c. All partitions with fire walls and security/acoustical partitions which extend to structure above noted. d. HVAC diffusers and returns. e. Light fixtures. f. Access Panels. g. Ceiling mounted signage. h. All required notes.
Roof Plans:	Roof Plans showing: a. Roof layout with all pertinent dimensions. b. Parapet walls, expansion joints, crickets, overflow scuppers, roof drains, gutters, and downspouts. c. Direction of roof slope and amount of slope (minimum 1/2" per foot desired). All valleys shall have positive slope. d. All roof mounted equipment (coordinated with structural, mechanical, and electrical drawings). Mount air terminals (lighting rods) on parapet terminals. e. All roof penetrations, vents, exhausts, skylights, monitors, and access hatches. f. Reference symbols for wall sections, building sections, and details. g. All necessary notes.

Table 11.2 (Continued)	***Architectural 100% Design Requirements***
Enlarged Floor Plans:	Enlarged Floor Plans showing: a. Enlarged toilet plans at 1/2" = 1'-0" with toilet fixtures (handicapped accessible and regular types) and toilet accessories labeled and special handicapped access clearances indicated. b. Kitchen layout with dimensions and equipment. c. Stairs with runs and widths, landings, and railings dimensioned. d. All necessary notes.
Architectural Elevations:	Architectural Elevations showing: a. All sides of building with vertical dimensions and floor level elevations. b. All finish materials and special requirements labeled. c. Expansion and crack control joints. d. Exterior doors. e. Windows with operating sash indicated. f. Exhaust fans, louvers, and grills. g. Gutters, downspouts, splash blocks, and overflow scuppers. h. Roof mounted equipment, exhaust stacks, and antennas. i. Reference symbols for section and detail cuts. j. All necessary notes.
Building Sections:	Building Sections (same scale as Architectural Floor Plans, when practical) showing: a. Floor, wall, partition, ceiling, and roof information for a minimum of one transverse and one cross section through entire building. b. Reference symbols for section and detail cuts. c. Doors, windows, finish materials, expansion joints, casework, toilet partitions, ladders, and signage. d. Lighting, HVAC registers and returns, built-in equipment
Interior Elevations:	Interior Elevations/Sections showing: a. Toilets with fixtures, vanities, partitions, finishes, and accessories with labels and reference symbols. b. Kitchen/food preparation area with equipment outlined, electrical outlets and switches at proper heights, fire extinguishers, alarm bells/horns, and HVAC equipment and registers/ returns. c. Janitor closets with shelving, wall hooks, and built-in equipment. d. Stairs with dimensioned railings, treads, risers, nosings, and framing.

Table 11.2 (Continued)	***Architectural Design 100% Submittal Requirements***

Wall Sections, Sections, and Details showing:	Wall Sections, Sections, and Details showing: a. All sections and details (including flashing, drip moldings, weepholes, vents, etc.) necessary for construction. b. Sections at minimum scale of 3/4"= 1'-0". c. Isometric details for each roof flashing condition at minimum scale of 3"= 1'-0" and with *all* applicable notes. d. Isometric detail of scuppers showing all flanges. e. Joint covers for metal coping covers and gravel stops. f. Roof crickets. g. Wall and roof insulation with "R-values". h. Door and window frame "head, jamb, and sill" details. Also astragals, weatherstripping, thresholds, floor level changes (such as at entrances), and physical security features. i. Toilet partition, shower pan, floor/roof/ balcony drains, and waterproofing details. j. Expansion joints, crack control joints for stucco/brick/cmu/concrete/ceramic tile/plaster, and joints between different finish materials. k. Stair/balcony railings and mounting brackets, wall-mounted doorstop bracing, vanity bracing, locker/ weapons rack mounts, curtain wall/ large window protective railings, and partition corner/corridor wall bumpers. l. Signage construction and method of mounting. m. Necessary notes. n. Titles referenced by Reference Symbol convention to Plans, Elevations, and Building Sections.
Schedules:	Schedules showing: a. Doors and frames with fire and acoustical rating, physical security feature notes, and detail reference numbers. b. Windows with frame material, glazing type, fire and acoustical rating, physical security feature notes, and detail reference numbers. c. Louvers with frame, vane operation, fire rating, physical security feature notes, and detail reference numbers. d. Interior finish materials for floor, base, walls, wainscot and ceiling with ceiling height. built-in cabinet finishes, window blinds, toilet partitions, bulletin boards and any other visible item attached to the building interior. Finishes for Systems Furniture shall be included. Also include exterior finish materials and color. e. Signage with frame, mounting, letter style and height, finish, color, text, and location information. f. Equipment.

Specifications	
Specifications:	Specifications shall be developed per Appendix D.

Table 11.3 Structural Design
100% Submittal Requirements

Drawings	
100% Submittal:	The 100% submission should include all drawings required for a 35% submittal plus all necessary detail sheets to complete the structural portion of the project. *Drawings shall be fully coordinated with the other disciplines and the specifications.*
General Conditions:	Show the following: a. Design criteria for loads, materials, and references, b. General notes for the project, c. Material notes such as structural steel, concrete, masonry, etc., d. Bid information such as pile/caisson lengths, e. Special load test requirements, f. Special inspections requirements g. Other information/instructions to contractor, h. Abbreviations and symbols used for structural drawings.
Foundation Plan:	Show the following: a. Layout of foundation support systems showing all dimensions and elevations necessary for construction, b. Size or schedule references for all foundation features such as footings, grade beams, piles, caissons, pile/caisson caps, etc., c. Control/expansion joints in floor slab and foundation walls, d. Trenches, pits, openings, depressed/ thickened slabs, e. Test pile/caisson location, f. Special construction features - de-watering, excavation, bracing, under-pinning, etc., g. Special construction sequencing, h. Existing site conditions/features, i. North arrow (orient plans so that north is to the top or left of the sheet), j. Graphic scales.
Framing Plans	Show the following: a. Layout of horizontal framing elements showing all dimensions, orientation and elevations necessary for construction – Elevations shall be referenced to some finished datum such as top of steel, slab, finished floor, concrete, etc. b. Size or schedule references for all horizontal framing elements such as beams, joists, slabs, decks, grating, etc., c. Slab control/expansion joints, d. Openings requiring special framing or reinforcing, e. Location of splices, brackets, penetrations, sleeves, embedments, bracing, weldments, etc., f. Special temporary bracing, shoring or forming, g. Other special requirements, such as equipment clearances, travel distances for hoists and cranes, etc., h. North arrow (orient plans so that north is to the top or left of the sheet), i. Graphic scales.

Elevations	Show the following: a. Layout of vertical framing elements showing all dimensions, orientations and elevations necessary for construction – reference elevations shall be consistent with framing plans. b. Size or schedule references for all vertical framing elements such as column, walls, piers, beams, bracing, etc., c. Wall control/expansion joints, d. Openings requiring special framing or reinforcing e. Location of splices, brackets, penetrations, sleeves, embedments, bracing, weldments, etc., f. Special temporary bracing, shoring or forming, g. Other special requirements such as equipment, clearances, travel distances for hoists and cranes, etc., h. Graphic scales.
Sections and Details:	a. Layout of all sections and details showing all parts, shapes, sizes, materials, dimensions, elevations, arrangement and orientation necessary for construction, b. Standard connections or schedule references for forces, fasteners, welds, plates, clips, ties stirrups, pins, etc., c. All special connections completely detailed to a point where no further engineering is necessary, d. Concrete/masonry wall reinforcement details showing size, clearances, placement, shape, etc., e. Lintel details or schedule references for loads, sizes, materials, arrangement, etc., f. Anchor bolts, base plates, bearing plates, or schedule reference for materials, size, thickness, welds, embedments, threaded parts, projections, etc., g. Diaphragm deck type, gauge, yield strength, minimum number of spans or length, fastener type and pattern, h. Applicable special notes and instructions, i. Graphic scales.
Structural Notes and Schedules:	a. Provide all information/instructions for fabrications, forming, placement, erection, installation, etc. necessary for construction. b. Schedules for beams, lintels, joist, trusses, frames, piles, caissons, footings, pile/caisson caps, grade beams, slabs, etc. c. Calculated column loads, beam shear/reaction and moments, footing pressures, pile/caisson capacities/loads (vertical and horizontal) etc. d. Special instructions, materials, process, etc.
Other Drawings:	a. Layout of structural systems for special fabrications and construction such as space trusses/frames, long span trusses, Vierendeel trusses, shells, towers, etc. b. Temporary structures to be dismantled/relocated

Calculations	
Calculations:	Calculations shall include the analysis and design of all (major cost contributing elements) beams, columns, walls, foundations, slabs, bracing, diaphragms, equipment supports, etc. and the connections to each other to provide a safe, stable, efficient and cost effective structural system. An adequate number of sketches with sufficient detail to make the designers intentions clear, concise and easily understandable shall be provided. All assumptions and references to codes, standards, criteria, drawings and computer outputs shall be noted as necessary.

Specifications	
Specifications:	Final specifications shall be developed per Appendix D.

Table 11.4 Mechanical Design 100% Submittal Requirements

Drawings	
100% Submittal:	The 100% submission should include all drawings required for a 35% submittal plus all necessary detail sheets to complete the mechanical portion of the project. *Drawings shall be fully coordinated with the other disciplines and the specifications.*
General:	Mechanical floor plans shall be not less than 1/8"=1'-0". Floor plan scales of 1/4"=1'-0" should be considered when the complexity of the work results in overcrowding of the drawings, such as in mechanical room layout and in the design of hospitals.
Drawings:	a. HVAC Floor Plans showing the location of major equipment and ductwork. All ductwork shall be shown double line, to scale. b. Plumbing Floor Plans showing potable water, DWV, compressed air, etc. c. HVAC and plumbing riser diagrams. d. HVAC and plumbing equipment schedules, showing sizes of major equipment. e. HVAC Design Conditions Schedule including tolerances of inside temperatures and relative humidities. f. Basic HVAC control diagrams and written sequence of control. g. Site layout showing points of utility connections, including sewer invert elevations at the five foot line. h. Exterior piping including chilled/hot water, condenser water, plumbing/ sanitary, steam, fuel, compressed air and gas piping, etc. i. Equipment locations. j. Fuel storage general arrangement. k. Roof Plans showing locations of equipment and ductwork l. Large Scale Plans as need to show congested areas m. Sections, elevations and details as required for MEP coordination n. Control Diagrams and written sequence of control o. Legends p. HVAC equipment and Plumbing Fixture Schedules q. Notes r. Design Conditions s. Other Details as required

Calculations	
General:	Corrected to include all previous submittal review comments and/or a clear statement why the review comment was not complied with.

Specifications	
Outline Specifications:	Outline specifications shall be developed per Appendix D.

Table 11.5 Fire Protection Design 100% Submittal Requirements

Drawings	
100% Submittal:	The 100% submission should include all drawings required for a 35% submittal plus all necessary detail sheets to complete the fire protection portion of the project. *Drawings shall be fully coordinated with the other disciplines and the specifications.*
Civil Drawings:	a. Show all new and existing water piping including sizes. b. Show new and existing valve and fire hydrant locations ensuring conformance with MIL-HDBK-1008-B. c. New valve and fire hydrants shall require an installation detail complete with guard posts. d. Show the water line supplying the sprinkler riser with the connection into the building. e. Show the location of any required fire pump or water storage tank.
Architectural Drawings:	a. Clearly show with details the location and rating of smoke and firewalls. Clearly indicate the specific hourly fire rating. b. A detail of the fire and smoke wall construction must be provided along with the particular Underwriters' Laboratories listing obtained from the latest edition of the U.L. Fire Resistance Directory. c. Provide details of any fire wall penetration for each type of wall construction, as outlined in the U.L. Building Materials Directory. d. Detail type and size of fire extinguisher to be provided. Base Fire Department should be contacted for further information. e. Provide the class and hour rating of fire doors on the door schedule.
Mechanical Drawings:	a. The location of sprinkler riser must be shown on the plumbing floor plan with a detail of the sprinkler riser also provided. (Note: Sprinkler piping layout is not shown) b. Show any CO^2 banks or clean agent tanks with a detail of the areas protected and a riser diagram. c. Show the location of smoke and fire dampers with a detail. d. Provide the physical layout of the fire pump and associated piping. e. Show, on the HVAC Drawings, any required duct mounted smoke detectors and intertie to shut down system when an alarm is triggered. f. Provide a fire stopping detail for penetrations of firewalls with reference.

Electrical Drawings:	a. The existing base wide fire alarm system must be determined. If an exterior master box is required, the location must be shown. A detail of the master box pedestal must also be provided. b. All fire alarm and suppression devices, including control panel, manual pull stations, automatic detectors, extinguishing system pressure switches, and audible devices, shall be located on an electrical floor plan. c. A fire alarm riser and suppression system diagram showing the interconnection of all fire alarm equipment is required. Ensure the power supply and point of connection to base wide fire alarm is shown. (Note: Source of power to fire alarm control panel shall be taken prior to the main power disconnect.) d. Emergency lighting locations shall be provided on the electrical floor plan with a detail of each type of emergency light fixture provided. e. The fire alarm zone, suppression, and annunciation schedule shall be detailed. Complex fire alarm systems such as jet engine test cells and hush houses, aircraft hangars, etc. shall require a chart detailing a sequence of operations. f. Fire stop details of electrical penetrations of fire wall with a note referring to the appropriate architectural sheet for fire wall location.

Table 11.5 (Continued)	***Fire Protection Design 100% Submittal Requirements***

Calculations	
General	Provide corrections to comments on previously reviewed calculations.

Specifications	
Specifications	Outline specifications shall be developed per Appendix D.

Table 11.6 Electrical Design 100% Submittal Requirements

Drawings	
100% Submittal:	The 100% submission should include all drawings required for a 35% submittal plus all necessary detail sheets to fully present the scope of the electrical work required for the project. *Drawings shall be fully coordinated with the other disciplines and the specifications.*
Existing Site and Demolition Plan:	This drawing shall include all existing site information such as buildings, pavements and utilities that affect the demolition of the electrical portions of the project. The specifications should indicate the disposition of demolished materials and equipment. The limits of demolition must be clearly defined, i.e., if a portion of overhead line is to be removed, provide a detail showing how the remaining portion is to be terminated.
Site Plan and Details:	This drawing shall show all new and existing aboveground and underground features such as buildings, pavements and utilities that affect or interface with the electrical portions of the project. As a minimum the following information shall be shown: a. Primary and secondary electrical lines b. Fire alarm and communications lines c. Transformer or substation (located by dimensions from the building or other prominent feature) d. Streets, parking area and other flood lighting e. All other exterior electrical equipment, such as M.G. sets, A/C units, etc. f. In congested areas a profile of duct lines may be required. g. Site details (light pole bases, transformers pads, trench details)
Lighting Plans and Details:	These drawings shall show the building's full floor plan (first, second, etc.) with the location and number of lighting fixtures, including the type and size of wiring serving these fixtures. Provide details of all lighting fixtures used, including mounting height and support details. Emergency, exit, and security lighting shall be included where required. Seismic restraint of fixtures shall be shown where required.
Power Plans and Details:	These drawings shall show a building's full floor plan (first, second, etc.) as well as any large-scale plans necessary to prevent overcrowding. The power plans should show the location of receptacles and electrical equipment and the type, size and location of wiring required throughout the facility.
Riser Diagrams:	All of the following: a. Power - Single Line Diagram b. Communications Plan c. Telephone Riser Diagram d. Computer network riser diagram and plan e. Other Riser Diagrams for Television, Paging, IDS, etc. f. Panel Schedules g. Switchboards and Motor Control Center Schedules h. Lighting Fixture Details

Calculations

General:	Corrected to include all previous submittal review comments or a clear statement why the review comment was not complied with.

Table 11.6 (Continued)	***Electrical Design 100% Submittal Requirements***

Specifications	
Final Specifications:	Outline specifications shall be developed per Appendix D.